Claims

1. An assembly, comprising:
a first tubular member comprising external threads; and
a second tubular member comprising internal threads coupled to the external threads of the first tubular member;
wherein at least one of the first and second tubular members define one or more stress concentrators.

2. The assembly of claim 1, further comprising:
an external sleeve coupled to and overlapping with the ends of the first and second tubular members.

3. The assembly of claim 1, wherein one or more of the stress concentrators comprise surface grooves formed in the surfaces of at least one of the first and second tubular members.

4. The assembly of claim 1, wherein the stress concentrators are defined above the internal and external threads of the first and second tubular members.

5. A method for forming a wellbore casing, comprising:
positioning the assembly of claim 1 within a borehole that traverses a subterranean formation; and
radially expanding and plastically deforming the assembly within the borehole.

6. A method for forming a wellbore casing, comprising:
positioning the assembly of claim 2 within a borehole that traverses a subterranean formation; and
radially expanding and plastically deforming the assembly within the borehole.

7. A method for forming a wellbore casing, comprising:
positioning the assembly of claim 3 within a borehole that traverses a subterranean formation; and
radially expanding and plastically deforming the assembly within the borehole.

8. A method for forming a wellbore casing, comprising:
positioning the assembly of claim 4 within a borehole that traverses a subterranean formation;

and

radially expanding and plastically deforming the assembly within the borehole.

9. An apparatus, comprising:
a wellbore that traverses a subterranean formation; and
a wellbore casing positioned within and coupled to the wellbore;
wherein the wellbore casing is coupled to the wellbore by a process comprising:
positioning the assembly of claim 1 within the wellbore; and
radially expanding and plastically deforming the assembly within the wellbore.

10. An apparatus, comprising:
a wellbore that traverses a subterranean formation; and
a wellbore casing positioned within and coupled to the wellbore;
wherein the wellbore casing is coupled to the wellbore by a process comprising:
positioning the assembly of claim 2 within the wellbore; and
radially expanding and plastically deforming the assembly within the wellbore.

11. An apparatus, comprising:
a wellbore that traverses a subterranean formation; and
a wellbore casing positioned within and coupled to the wellbore;
wherein the wellbore casing is coupled to the wellbore by a process comprising:
positioning the assembly of claim 3 within the wellbore; and
radially expanding and plastically deforming the assembly within the wellbore.

12. An apparatus, comprising:
a wellbore that traverses a subterranean formation; and
a wellbore casing positioned within and coupled to the wellbore;
wherein the wellbore casing is coupled to the wellbore by a process comprising:
positioning the assembly of claim 4 within the wellbore; and
radially expanding and plastically deforming the assembly within the wellbore.

15. A system for forming a wellbore casing, comprising:
means for positioning the assembly of claim 1 within a borehole that traverses a subterranean formation; and
means for radially expanding and plastically deforming the assembly within the borehole.

16. A system for forming a wellbore casing, comprising:

means for positioning the assembly of claim 2 within a borehole that traverses a subterranean formation; and

means for radially expanding and plastically deforming the assembly within the borehole.

17. A system for forming a wellbore casing, comprising:

means for positioning the assembly of claim 3 within a borehole that traverses a subterranean formation; and

means for radially expanding and plastically deforming the assembly within the borehole.

18. A system for forming a wellbore casing, comprising:

means for positioning the assembly of claim 4 within a borehole that traverses a subterranean formation; and

means for radially expanding and plastically deforming the assembly within the borehole.

19. A method of providing a fluid tight seal between a pair of overlapping tubular members, comprising:

forming one or more stress concentrators within at least one of the tubular members; and

radially expanding and plastically deforming the tubular members.

20. The method of claim 19, wherein the tubular members are threadably coupled; and wherein the stress concentrators are formed above the threaded coupling.

21. The method of claim 19, wherein the stress concentrators comprise surface grooves formed in at least one of the tubular members.

22. An assembly, comprising:

a first tubular member comprising external threads;

a second tubular member comprising internal threads coupled to the external threads of the first tubular member; and

an external sleeve coupled to and overlapping with the ends of the first and second tubular members;

wherein at least one of the first and second tubular members define one or more stress concentrators.

23. The assembly of claim 22, wherein one or more of the stress concentrators comprise surface grooves formed in the surfaces of at least one of the first and second tubular members.

24. The assembly of claim 22, wherein the stress concentrators are defined above the internal and external threads of the first and second tubular members.

25. A method for forming a wellbore casing, comprising:

positioning an assembly within a borehole that traverses a subterranean formation; and

radially expanding and plastically deforming the assembly within the borehole;

wherein the assembly comprises:

a first tubular member comprising external threads;

a second tubular member comprising internal threads coupled to the external threads of the first tubular member; and

an external sleeve coupled to and overlapping with the ends of the first and second tubular members;

wherein at least one of the first and second tubular members define one or more stress concentrators.

26. An apparatus, comprising:

a wellbore that traverses a subterranean formation; and

a wellbore casing positioned within and coupled to the wellbore;

wherein the wellbore casing is coupled to the wellbore by a process comprising:

positioning an assembly within a borehole that traverses a subterranean formation; and

radially expanding and plastically deforming the assembly within the borehole;

wherein the assembly comprises:

a first tubular member comprising external threads;

a second tubular member comprising internal threads coupled to the external threads of the first tubular member; and

an external sleeve coupled to and overlapping with the ends of the first and second tubular members;

wherein at least one of the first and second tubular members define one or more stress concentrators.

27. A system for forming a wellbore casing, comprising:

means for positioning an assembly within a borehole that traverses a subterranean formation;

and

means for radially expanding and plastically deforming the assembly within the borehole;

wherein the assembly comprises:

a first tubular member comprising external threads;

a second tubular member comprising internal threads coupled to the external threads of the first tubular member; and

an external sleeve coupled to and overlapping with the ends of the first and second tubular members;

wherein at least one of the first and second tubular members define one or more stress concentrators.

28. An assembly, comprising:

a first tubular member comprising external threads; and

a second tubular member comprising internal threads coupled to the external threads of the first tubular member;

wherein the first and second tubular members each define one or more stress concentrators.

29. The assembly of claim 28, further comprising:

an external sleeve coupled to and overlapping with the ends of the first and second tubular members.

30. The assembly of claim 28, wherein one or more of the stress concentrators comprise surface grooves formed in the surfaces of at least one of the first and second tubular members.

31. The assembly of claim 28, wherein the stress concentrators are defined above the internal and external threads of the first and second tubular members.

32. A method for forming a wellbore casing, comprising:

positioning the assembly of claim 28 within a borehole that traverses a subterranean formation; and

radially expanding and plastically deforming the assembly within the borehole.

33. A method for forming a wellbore casing, comprising:

positioning the assembly of claim 29 within a borehole that traverses a subterranean formation; and

radially expanding and plastically deforming the assembly within the borehole.

34. A method for forming a wellbore casing, comprising:
positioning the assembly of claim 30 within a borehole that traverses a subterranean formation; and
radially expanding and plastically deforming the assembly within the borehole.

35. A method for forming a wellbore casing, comprising:
positioning the assembly of claim 31 within a borehole that traverses a subterranean formation; and
radially expanding and plastically deforming the assembly within the borehole.

36. An apparatus, comprising:
a wellbore that traverses a subterranean formation; and
a wellbore casing positioned within and coupled to the wellbore;
wherein the wellbore casing is coupled to the wellbore by a process comprising:
positioning the assembly of claim 28 within the wellbore; and
radially expanding and plastically deforming the assembly within the wellbore.

37. An apparatus, comprising:
a wellbore that traverses a subterranean formation; and
a wellbore casing positioned within and coupled to the wellbore;
wherein the wellbore casing is coupled to the wellbore by a process comprising:
positioning the assembly of claim 29 within the wellbore; and
radially expanding and plastically deforming the assembly within the wellbore.

38. An apparatus, comprising:
a wellbore that traverses a subterranean formation; and
a wellbore casing positioned within and coupled to the wellbore;
wherein the wellbore casing is coupled to the wellbore by a process comprising:
positioning the assembly of claim 30 within the wellbore; and
radially expanding and plastically deforming the assembly within the wellbore.

39. An apparatus, comprising:
a wellbore that traverses a subterranean formation; and

a wellbore casing positioned within and coupled to the wellbore;
wherein the wellbore casing is coupled to the wellbore by a process comprising:
positioning the assembly of claim 31 within the wellbore; and
radially expanding and plastically deforming the assembly within the wellbore.

40. A system for forming a wellbore casing, comprising:
means for positioning the assembly of claim 28 within a borehole that traverses a subterranean formation; and
means for radially expanding and plastically deforming the assembly within the borehole.

41. A system for forming a wellbore casing, comprising:
means for positioning the assembly of claim 29 within a borehole that traverses a subterranean formation; and
means for radially expanding and plastically deforming the assembly within the borehole.

42. A system for forming a wellbore casing, comprising:
means for positioning the assembly of claim 30 within a borehole that traverses a subterranean formation; and
means for radially expanding and plastically deforming the assembly within the borehole.

43. A system for forming a wellbore casing, comprising:
means for positioning the assembly of claim 31 within a borehole that traverses a subterranean formation; and
means for radially expanding and plastically deforming the assembly within the borehole.

44. A method of providing a fluid tight seal between a pair of overlapping tubular members, comprising:
forming one or more stress concentrators within each of the tubular members; and
radially expanding and plastically deforming the tubular members.

45. The method of claim 44, wherein the tubular members are threadably coupled; and wherein the stress concentrators are formed above the threaded coupling.

46. The method of claim 44, wherein the stress concentrators comprise surface grooves formed in at least one of the tubular members.

47. A method of providing a fluid tight seal between a pair of overlapping tubular members, comprising:

concentrating compressive stresses onto the overlapping portions of the tubular members; and

radially expanding and plastically deforming the tubular members.

48. The method of claim 47, wherein the tubular members are threadably coupled; and

wherein the compressive stresses are concentrated onto the threaded coupling during the radial expansion and plastic deformation.

49. A method for manufacturing an expandable member used to complete a structure by radially expanding and plastically deforming the expandable member comprising:

forming the expandable member from a steel alloy comprising a charpy energy of at least about 90 ft-lbs.

50. An expandable member for use in completing a structure by radially expanding and plastically deforming the expandable member, comprising:

a steel alloy comprising a charpy energy of at least about 90 ft-lbs.

51. A structural completion positioned within a structure, comprising:

one or more radially expanded and plastically deformed expandable members positioned within the structure;

wherein one or more of the radially expanded and plastically deformed expandable members are fabricated from a steel alloy comprising a charpy energy of at least about 90 ft-lbs.

52. A method for manufacturing an expandable member used to complete a structure by radially expanding and plastically deforming the expandable member, comprising:

forming the expandable member from a steel alloy comprising a weight percentage of carbon of less than about 0.08%.

53. An expandable member for use in completing a wellbore by radially expanding and plastically deforming the expandable member at a downhole location in the wellbore, comprising:

a steel alloy comprising a weight percentage of carbon of less than about 0.08%.

54. A structural completion, comprising:

one or more radially expanded and plastically deformed expandable members positioned within the wellbore;

wherein one or more of the radially expanded and plastically deformed expandable members are fabricated from a steel alloy comprising a weight percentage of carbon of less than about 0.08%.

55. A method for manufacturing an expandable member used to complete a structure by radially expanding and plastically deforming the expandable member, comprising:

forming the expandable member from a steel alloy comprising a weight percentage of carbon of less than about 0.20% and a charpy V-notch impact toughness of at least about 6 joules.

56. An expandable member for use in completing a structure by radially expanding and plastically deforming the expandable member, comprising:

a steel alloy comprising a weight percentage of carbon of less than about 0.20% and a charpy V-notch impact toughness of at least about 6 joules.

57. A structural completion, comprising:

one or more radially expanded and plastically deformed expandable members;

wherein one or more of the radially expanded and plastically deformed expandable members are fabricated from a steel alloy comprising a weight percentage of carbon of less than about 0.20% and a charpy V-notch impact toughness of at least about 6 joules.

58. A method for manufacturing an expandable member used to complete a structure by radially expanding and plastically deforming the expandable member, comprising:

forming the expandable member from a steel alloy comprising the following ranges of weight percentages:

C, from about 0.002 to about 0.08;

Si, from about 0.009 to about 0.30;

Mn, from about 0.10 to about 1.92;

P, from about 0.004 to about 0.07;

S, from about 0.0008 to about 0.006;

Al, up to about 0.04;

N, up to about 0.01;

Cu, up to about 0.3;

Cr, up to about 0.5;

Ni, up to about 18;

Nb, up to about 0.12;

Ti, up to about 0.6;

Co, up to about 9; and

Mo, up to about 5.

59. An expandable member for use in completing a structure by radially expanding and plastically deforming the expandable member, comprising:

a steel alloy comprising the following ranges of weight percentages:

C, from about 0.002 to about 0.08;

Si, from about 0.009 to about 0.30;

Mn, from about 0.10 to about 1.92;

P, from about 0.004 to about 0.07;

S, from about 0.0008 to about 0.006;

Al, up to about 0.04;

N, up to about 0.01;

Cu, up to about 0.3;

Cr, up to about 0.5;

Ni, up to about 18;

Nb, up to about 0.12;

Ti, up to about 0.6;

Co, up to about 9; and

Mo, up to about 5.

60. A structural completion, comprising:

one or more radially expanded and plastically deformed expandable members;

wherein one or more of the radially expanded and plastically deformed expandable members are fabricated from a steel alloy comprising the following ranges of weight percentages:

C, from about 0.002 to about 0.08;

Si, from about 0.009 to about 0.30;

Mn, from about 0.10 to about 1.92;

P, from about 0.004 to about 0.07;

S, from about 0.0008 to about 0.006;
Al, up to about 0.04;
N, up to about 0.01;
Cu, up to about 0.3;
Cr, up to about 0.5;
Ni, up to about 18;
Nb, up to about 0.12;
Ti, up to about 0.6;
Co, up to about 9; and
Mo, up to about 5.

61. A method for manufacturing an expandable tubular member used to complete a structure by radially expanding and plastically deforming the expandable member, comprising:

forming the expandable tubular member with a ratio of the of an outside diameter of the expandable tubular member to a wall thickness of the expandable tubular member ranging from about 12 to 22.

62. An expandable member for use in completing a structure by radially expanding and plastically deforming the expandable member, comprising:

an expandable tubular member with a ratio of the of an outside diameter of the expandable tubular member to a wall thickness of the expandable tubular member ranging from about 12 to 22.

63. A structural completion, comprising:

one or more radially expanded and plastically deformed expandable members positioned within the structure;

wherein one or more of the radially expanded and plastically deformed expandable members are fabricated from an expandable tubular member with a ratio of the of an outside diameter of the expandable tubular member to a wall thickness of the expandable tubular member ranging from about 12 to 22.

64. A method of constructing a structure, comprising:

radially expanding and plastically deforming an expandable member;

wherein an outer portion of the wall thickness of the radially expanded and plastically deformed expandable member comprises tensile residual stresses.

65. A structural completion, comprising:

one or more radially expanded and plastically deformed expandable members;

wherein an outer portion of the wall thickness of one or more of the radially expanded and plastically deformed expandable members comprises tensile residual stresses.

66. A method of constructing a structure using an expandable tubular member, comprising:

strain aging the expandable member; and

then radially expanding and plastically deforming the expandable member.

67. A method for manufacturing a tubular member used to complete a wellbore by radially expanding the tubular member at a downhole location in the wellbore comprising: forming a steel alloy comprising a concentration of carbon between approximately 0.002% and 0.08% by weight of the steel alloy.

68. The method of claim 67, further comprising forming the steel alloy with a concentration of niobium comprising between approximately 0.015% and 0.12% by weight of the steel alloy.

69. The method of claim 67, further comprising: forming the steel alloy with low concentrations of niobium and titanium; and limiting the total concentration of niobium and titanium to less than approximately 0.6% by weight of the steel alloy.

70. An expandable tubular member fabricated from a steel alloy having a concentration of carbon between approximately 0.002% and 0.08% by weight of the steel alloy.

71. A method for manufacturing an expandable tubular member used to complete a wellbore completion within a wellbore that traverses a subterranean formation by radially expanding and plastically deforming the expandable tubular member within the wellbore, comprising:

forming the expandable tubular member from a steel alloy comprising a charpy energy of at least about 90 ft-lbs;

forming the expandable member from a steel alloy comprising a charpy V-notch impact toughness of at least about 6 joules;

forming the expandable member from a steel alloy comprising the following ranges of weight percentages:

C, from about 0.002 to about 0.08;

Si, from about 0.009 to about 0.30;

Mn, from about 0.10 to about 1.92;

P, from about 0.004 to about 0.07;

S, from about 0.0008 to about 0.006;

Al, up to about 0.04;

N, up to about 0.01;

Cu, up to about 0.3;

Cr, up to about 0.5;

Ni, up to about 18;

Nb, up to about 0.12;

Ti, up to about 0.6;

Co, up to about 9; and

Mo, up to about 5;

forming the expandable tubular member with a ratio of the of an outside diameter of the expandable tubular member to a wall thickness of the expandable tubular member ranging from about 12 to 22; and

strain aging the expandable tubular member prior to the radial expansion and plastic deformation of the expandable tubular member within the wellbore.

72. An expandable tubular member for use in completing a wellbore completion within a wellbore that traverses a subterranean formation by radially expanding and plastically deforming the expandable tubular member within the wellbore, comprising:

a steel alloy having a charpy energy of at least about 90 ft-lbs;

a steel alloy having a charpy V-notch impact toughness of at least about 6 joules; and

a steel alloy comprising the following ranges of weight percentages:

C, from about 0.002 to about 0.08;

Si, from about 0.009 to about 0.30;

Mn, from about 0.10 to about 1.92;

P, from about 0.004 to about 0.07;

S, from about 0.0008 to about 0.006;

Al, up to about 0.04;

N, up to about 0.01;

Cu, up to about 0.3;

Cr, up to about 0.5;

Ni, up to about 18;

Nb, up to about 0.12;

Ti, up to about 0.6;

Co, up to about 9; and

Mo, up to about 5;

wherein a ratio of the of an outside diameter of the expandable tubular member to a wall thickness of the expandable tubular member ranging from about 12 to 22; and

wherein the expandable tubular member is strain aged prior to the radial expansion and plastic deformation of the expandable tubular member within the wellbore.

73. A wellbore completion positioned within a wellbore that traverses a subterranean formation, comprising:

one or more radially expanded and plastically deformed expandable tubular members positioned within the wellbore completion;

wherein one or more of the radially expanded and plastically deformed expandable tubular members are fabricated from:

a steel alloy comprising a charpy energy of at least about 90 ft-lbs;

a steel alloy comprising a charpy V-notch impact toughness of at least about 6 joules; and

a steel alloy comprising the following ranges of weight percentages:

C, from about 0.002 to about 0.08;

Si, from about 0.009 to about 0.30;

Mn, from about 0.10 to about 1.92;

P, from about 0.004 to about 0.07;

S, from about 0.0008 to about 0.006;

Al, up to about 0.04;

N, up to about 0.01;

Cu, up to about 0.3;

Cr, up to about 0.5;

Ni, up to about 18;

Nb, up to about 0.12;

Ti, up to about 0.6;

Co, up to about 9; and

Mo, up to about 5;

wherein at least one of the expandable members comprises a ratio of the of an outside diameter of the expandable member to a wall thickness of the expandable member ranging from about 12 to 22;

wherein an outer portion of the wall thickness of at least one of the radially expanded and plastically deformed expandable comprises tensile residual stresses; and

wherein at least one of the expandable tubular member is strain aged prior to the radial expansion and plastic deformation of the expandable tubular member within the wellbore.